SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-43

Name: Lake Lakota **County**: Lincoln
Legal Description: T97N-R48W-Sec. 19
Location from nearest town: 1 mile south, 3-1/2 miles west of Fairview, SD

Dates of present survey: June 3, 2010 (all species electrofishing)
Date last surveyed: June 4, 2008 (all species electrofishing)

Managed Species	Other Species
Largemouth Bass	Yellow Perch
Bluegill	Black Bullhead
Black Crappie	White Crappie

PHYSICAL DATA

Surface Area: 100 acres **Watershed area**: 25,462 acres
Maximum depth: 25 feet **Mean depth**: 12 feet
Volume: No data **Shoreline length**: No data
Contour map available: Yes **Date mapped**: Unknown
OHWM elevation: None set **Date set**: NA
Outlet elevation: None set **Date set**: NA
Lake elevation observed during the survey: Full
Beneficial use classifications: (4) warmwater permanent fish propagation, (7) immersion recreation, (8) limited-contact recreation and (9) fish and wildlife propagation and stock watering.

Introduction

Lake Lakota was originally named Pattee Creek Watershed Structure P-1 because of its location in the Pattee Creek Watershed Project. The lake provides excellent fishing when full, but a leak in the basin causes frequent draw downs. The lake was not surveyed from 1999 to 2004 due to low water.

Ownership of Lake and Adjacent Lakeshore Properties

Lake Lakota and the surrounding land are owned and managed by the South Dakota Department of Game, Fish and Parks. Land management is split between the Parks and the Wildlife Divisions.

Field Observations of Water Quality and Aquatic Vegetation

Sago pondweed (*Potamogeton pectinatus*), floating leaf pondweed (*Potamogeton natans*) and coontail (*Ceratophyllum demersum*) covered approximately 75 percent of the surface area of the lake this year. The water was very clear with a Secchi depth measurement of 1 m (39.4 in) and no floating algae was observed.

BIOLOGICAL DATA

Methods:

The fish population was sampled by nighttime electrofishing for 1.67 hours on June 3, 2010. Electrofishing is used because dense stands of submergent vegetation make sampling with trap nets ineffective.

Results and Discussion:

Electrofishing Catch

Yellow perch was the most abundant species (43.7%) sampled followed by black bullhead, black crappie, largemouth bass, bluegill, walleye and smallmouth bass (Table 1).

Table 1. Total catch of 1.67 hours of electrofishing at Lake Lakota, Lincoln County, June 3, 2010.

Species	#	%	CPUE	80% C. I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Yellow Perch	390	43.7	234.0	±17.1	35.2	0	0	--
Black Bullhead	176	19.7	105.6	±12.1	48.6	2	2	84
Black Crappie	175	19.6	105.0	±8.7	16.8	1	0	100
Largemouth Bass	78	8.7	46.8	±8.8	117.7	73	42	102
Bluegill	70	7.8	42.0	±4.3	87.5	39	3	92
Walleye	2	0.2	1.2	±0.3	1.5	--	--	--
Smallmouth Bass	1	0.1	0.6	±0.3	0.0	--	--	--

* Four years (1999, 2004, 2006, 2008)

Table 2. Catch per hour by length category for various fish species captured by electrofishing in Lake Lakota June 3, 2010.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Yellow Perch	229.2	4.8	4.8	--	--	234.0	±17.1
Black Bullhead	73.8	31.8	31.2	--	0.6	105.6	±12.1
Black Crappie	--	105.0	104.4	0.6	--	105.0	±8.7
Largemouth Bass	8.4	38.4	10.2	12.0	16.2	46.8	±8.8
Bluegill	--	42.0	25.8	15.0	1.2	42.0	±4.3
Walleye	--	1.2	--	0.6	0.6	1.2	±0.3
Smallmouth Bass	--	0.6	--	--	0.6	0.6	±0.3

*No length categories established. Length categories can be found in Appendix A.

Largemouth Bass

Management objective: Maintain a largemouth bass fishery with an electrofishing CPUE of at least 20 in three out of five lake surveys.

Largemouth bass electrofishing CPUE was 46.8 with a PSD of 73 (Table 1) and 27 bass longer than 38 cm (15 in) were captured. CPUE has decreased each of the last three lake surveys (Table 3) but is still above the management objective. Growth rates were above average for South Dakota waters (Table 4) and multiple year classes were present with age-4 fish most abundant (Table 4 and Figure 1). Sampled bass ranged in length from 130 to 540 mm (5.1 – 21.3 in).

Table 3. Largemouth bass electrofishing CPUE, PSD, RSD-P, and mean Wr for Lake Lakota, Lincoln County, 2002-2010.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	Mean*
CPUE			312.6		88.2		64.8		46.8	155.2
PSD			59		78		87		73	75
RSD-P			0		28		80		42	36
Mean Wr			100		104		101		102	102

* 3 years (2004, 2006, 2008)

Table 4. Average back-calculated lengths, in mm, for each age class of largemouth bass from Lake Lakota, Lincoln County, June 3, 2010.

			Back-calculation Age							
Year Class	Age	N	1	2	3	4	5	6	7	8
2009	1	3	93							
2008	2	13	97	177						
2007	3	9	119	203	275					
2006	4	21	99	179	257	311				
2005	5	9	112	191	259	318	351			
2004	6	7	108	189	273	344	391	418		
2003	7	8	125	221	323	388	434	468	487	
2002	8	2	144	266	363	413	461	483	503	525
2001	9	1	138	222	311	346	375	397	420	445
All Classes		**73**	**115**	**206**	**295**	**353**	**402**	**442**	**470**	**485**
Statewide Mean			96	182	250	305	342			
Region III Mean			111	212	287	347	383			
SLI* Mean			99	183	246	299	332			

*Small Lakes and Impoundments (<150 acres)

Bluegill

Management objective: Maintain a bluegill fishery with an electrofishing CPUE of at least 50 and RSD-18 of at least 20 in three out of five lake surveys.

Bluegill CPUE has declined significantly since the 2008 survey (Table 5) and most of the fish sampled were two years old. Three year classes were present indicating consistent natural reproduction (Table 6). Growth to age-2 was similar to the statewide means (Table 6); however, growth of age-4 bluegills from the large 2006 year class was slow, especially since the 2008 survey. The recent slow-down in growth of bluegill is a concern because they have traditionally grown well and provided a high quality fishery (RSD-18 > 50 in 2004 and 2006). We attribute Lakota's high productivity and good fish growth to the constantly fluctuating water levels due to seepage through the lake basin. However, several years of stable water levels due to above average precipitation may be contributing to the slowdown in growth of the bluegills.

Table 5. Bluegill electrofishing CPUE, PSD, RSD-P, and mean Wr for Lake Lakota, Lincoln County, 2002-2010.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	Mean*
CPUE			5.4		70.8		244.2		42.0	106.8
PSD			89		81		51		39	74
RSD-18			56		61		1		6	39
RSD-P			44		6		1		3	17
Mean Wr			118		129		128		92	125

* 3 years (2004, 2006, 2008)

Table 6. Average back-calculated lengths (mm) for each age class of bluegills in Lake Lakota, Lincoln County, 2010.

			Back-calculation Age							
Year Class	Age	N	1	2	3	4	5	6	7	8
2008	2	40	60	125						
2007	3	24	60	118	143					
2006	4	7	62	123	146	166				
All Classes		**71**	**61**	**122**	**144**	**166**				
Statewide Mean			55	103	141	166				
Region III Mean			60	116	157	180				
SLI* Mean			53	101	138	163				

*Small Lakes and Impoundments (<150 acres)

Black Crappie

Management objective: Maintain a black crappie fishery with an electrofishing CPUE of at least 50 and RSD-P of at least 10 in three out of five lake surveys.

Black crappie CPUE was very high this year due to a large year class produced in 2008 (Table7 and Table 8). Growth was near the regional mean and above the statewide and small impoundments means (Table 8). Condition (Wr) was still good, but has declined from past surveys (Table 7), similar to that seen for bluegills.

Table 7. Black crappie electrofishing CPUE, PSD, RSD-P, and mean Wr for Lake Lakota, Lincoln County, 2002-2010.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	Mean*
CPUE			49.8		2.4		15.0		105.0	22.4
PSD			0		--		5		1	3
RSD-P			0		--		5		0	3
Mean Wr			124		--		109		100	117

* 3 years (2004, 2006, 2008)

Table 8. Average back-calculated lengths (mm) for each age class of black crappies in Lake Lakota, Lincoln County, 2010.

			Back-calculation Age							
Year Class	Age	N	1	2	3	4	5	6	7	8
2008	2	171	90	143						
2007	3	3	94	153	170					
2006	4	1	96	204	227	242				
All Classes		**175**	**93**	**167**	**198**	**242**				
Statewide Mean			83	147	195	229	249			
Region III Mean			95	167	219	253	274			
SLI* Mean			78	134	180	209	226			

*Small Lakes and Impoundments (<150 acres)

All Species

Black bullhead numbers increased this year with more small fish sampled (Table 9). Small (4 -5 in) yellow perch were abundant (Table 1) which may be contributing to poor angling success for the large bass.

Table 9. Electrofishing CPUE for all fish species sampled in Lake Lakota, Lincoln County, 2002-2010.

Species	2002	2003	2004	2005	2006	2007	2008	2009	2010
BLB			51.0		38.4		57.6		105.6
BLG			5.4		70.8		244.2		42.0
LMB			312.6		88.2		64.8		46.8
SMB			--		--		--		0.6
WHC			2.4		3.6		--		--
BLC			49.8		2.4		15.0		105.0
YEP			28.2		8.4		65.4		234.0
WAE			--		--		--		1.2

BLB (Black Bullhead), CCF (Channel Catfish), BLG (Bluegill), LMB (Largemouth Bass), SMB (Smallmouth Bass), WHC (White Crappie), BLC (Black Crappie), YEP (Yellow Perch), WAE (Walleye)

MANAGEMENT RECOMMENDATIONS

1. Continue to monitor Lakota with an all-species electrofishing survey every other year.

2. Consider an artificial drawdown to boost fish growth if normal water fluctuations do not occur within the next two years.

Table 10. Stocking record for Lake Lakota, Lincoln County, 1996-2010.

Year	Number	Species	Size
1996	1,716	Yellow Perch	Adult
2001	10,000	Largemouth Bass	Fingerling
	5,965	Rainbow Trout	Catchable
	18,700	Rainbow Trout	Fingerling
	1,056	Yellow Perch	Adult
2003	10,070	Largemouth Bass	Fingerling
2004	980	Bluegill	Adult
	9,500	Largemouth Bass	Fingerling

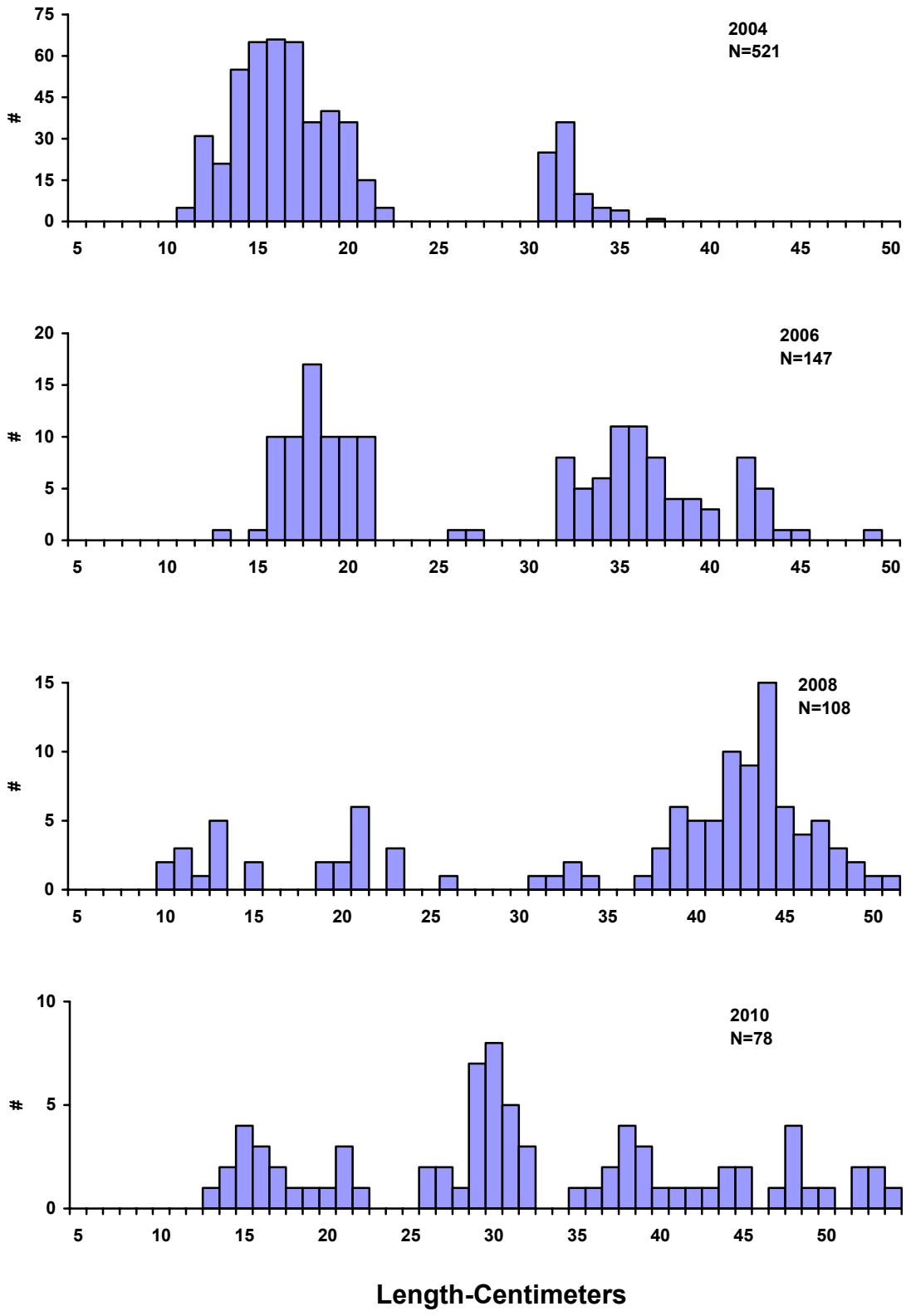

Figure 1. Length frequency histograms of largemouth bass sampled by electrofishing from Lake Lakota, Lincoln County, 2004, 2006, 2008, and 2010.

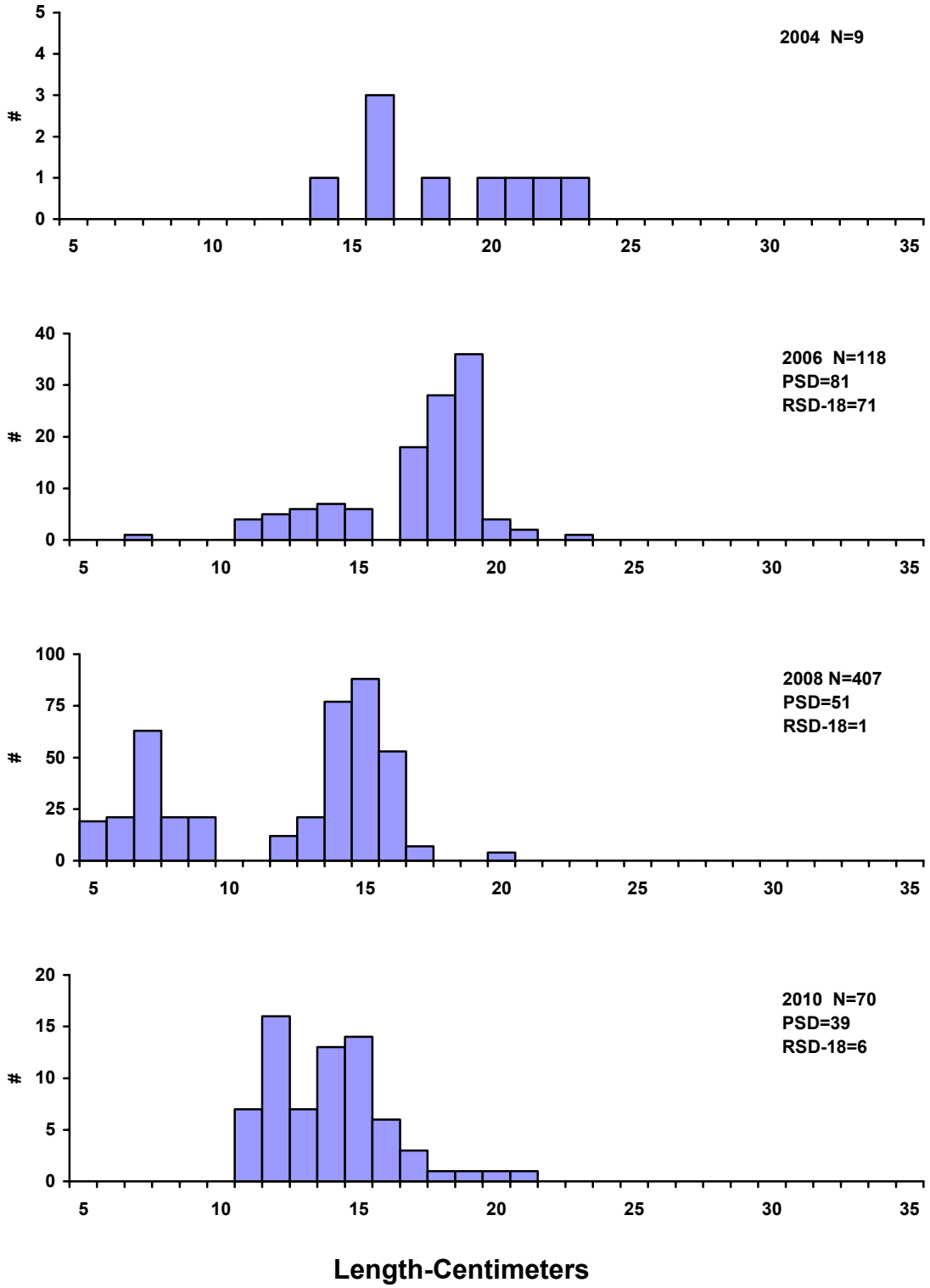

Figure 2. Length frequency histograms of bluegills sampled by electrofishing from Lake Lakota, Lincoln County, 2004, 2006, 2008, and 2010.

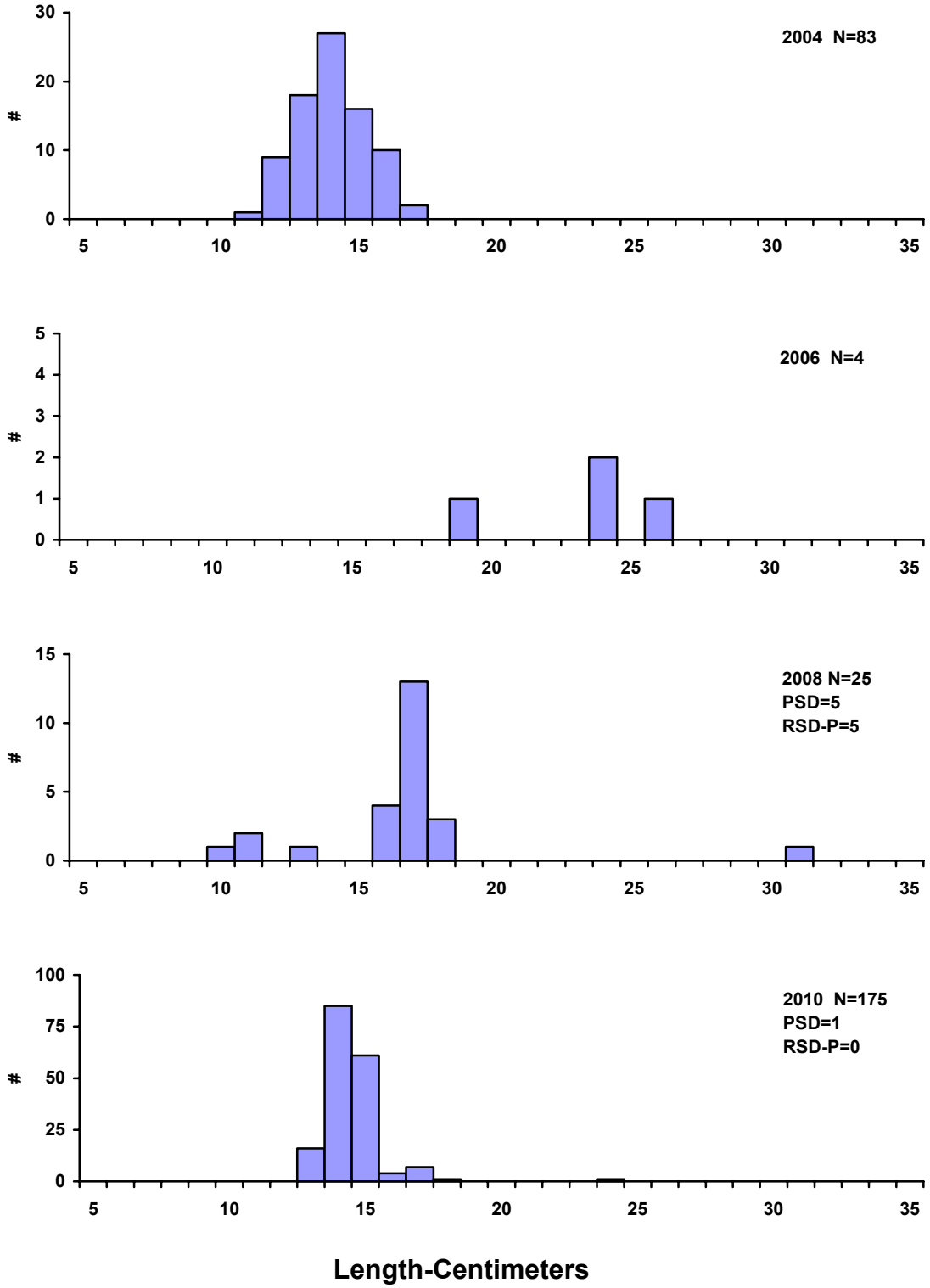

Figure 3. Length frequency histograms of black crappies sampled by electrofishing from Lake Lakota, Lincoln County, 2004, 2006, 2008, and 2010.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$PSD = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$RSD\text{-}P = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters (inches in parenthesis).

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25 (10)	38 (15)	51 (20)	63 (25)	76 (30)
Yellow perch	13 (5)	20 (8)	25 (10)	30 (12)	38 (15)
Black crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
White crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
Bluegill	8 (3)	15 (6)	20 (8)	25 (10)	30 (12)
Largemouth bass	20 (8)	30 (12)	38 (15)	51 (20)	63 (25)
Smallmouth bass	18 (7)	28 (11)	35(14)	43 (17)	51 (20)
Northern pike	35 (14)	53 (21)	71 (28)	86 (34)	112 (44)
Channel catfish	28 (11)	41 (16)	61 (24)	71 (28)	91 (36)
Black bullhead	15 (6)	23 (9)	30 (12)	38 (15)	46 (18)
Common carp	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)
Bigmouth buffalo	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.